

## هيكل العلوم



### تم تحميل هذا الملف من موقع المناهج الإماراتية

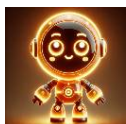
موقع المناهج ← المناهج الإماراتية ← الصف الثامن ← علوم ← الفصل الثالث ← ملفات متنوعة ← الملف

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ملفات اكتب للمعلم اكتب للطالب اختبارات الكترونية اختبارات حلول عروض بوربوينت أوراق عمل منهج انجليزي ملخصات وتقارير مذكرات وبنوك الامتحان النهائي للمدرس

المزيد من مادة  
علوم:

### التواصل الاجتماعي بحسب الصف الثامن



الرياضيات



اللغة الانجليزية



اللغة العربية



التربية الاسلامية



المواد على تلغرام

صفحة المناهج  
الإماراتية على  
فيسبوك

### المزيد من الملفات بحسب الصف الثامن والمادة علوم في الفصل الثالث

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| حلول تدريبات الأسئلة المتوقعة هيكل      | 1 |
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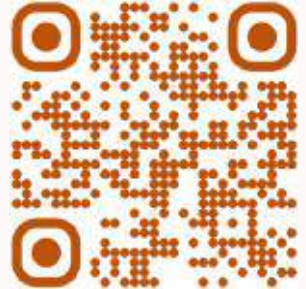
# هيكال العلوم انسباير الصف الثامن الفصل الثالث 2025-2026

احجز مكانك واستعد للامتحان بثقة كاملة

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Q1: Understand and apply the relationship between wave amplitude and energy, specifically recognizing that energy is proportional to the square of amplitude

(Unit:3, Page:20)

### الأسئلة الموضوعية - MCQ



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**Question 1a**

**Write down the relationship between amplitude (A) of a wave and its energy (E)?**

- A)  $E \propto \frac{1}{A}$  (Energy is inversely proportional to amplitude)  
B)  $E \propto A$  (Energy is directly proportional to amplitude)  
C)  $E \propto A^2$  (Energy is directly proportional to the square of amplitude)  
D)  $E \propto \sqrt{A}$  (Energy is directly proportional to the square root of amplitude)

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

**Question 1b**

The table below shows the amplitude of 3 waves X, Y and Z.

| Wave | Amplitude<br>(Units) | Energy<br>(Units) |
|------|----------------------|-------------------|
| W    | 1                    |                   |
| X    | 2                    |                   |
| Y    | 5                    |                   |

Determine the missing values of the energy for the waves W, X, and Y respectively.

A)  $W = 1, X = 4, Y = 10$

B)  $W = 1, X = 4, Y = 25$

C)  $W = 2, X = 4, Y = 10$

D)  $W = 1, X = 2, Y = 5$

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

### Question 1c

The table below shows the energy of 3 waves: W, X, and Y.

| Wave | Amplitude<br>(Units) | Energy<br>(Units) |
|------|----------------------|-------------------|
| W    |                      | 1                 |
| X    |                      | 36                |
| Y    |                      | 64                |

Determine the missing values of the amplitude for the waves W,  
X, and Y respectively

A)  $W = 1, X = 6, Y = 8$

B)  $W = 1, X = 18, Y = 32$

C)  $W = 1, X = 6, Y = 32$

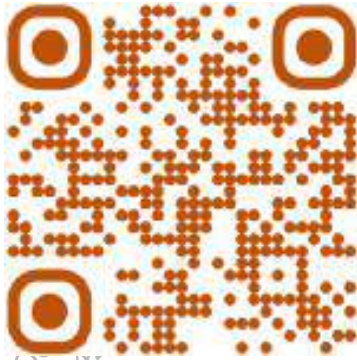
D)  $W = 2, X = 6, Y = 8$

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

Q2: Understand and apply the concept of frequency as the number of wave cycles per second, and interpret wave diagrams to determine frequency.

(Unit:3, Page:26,27)

### الأسئلة الموضوعية - MCQ



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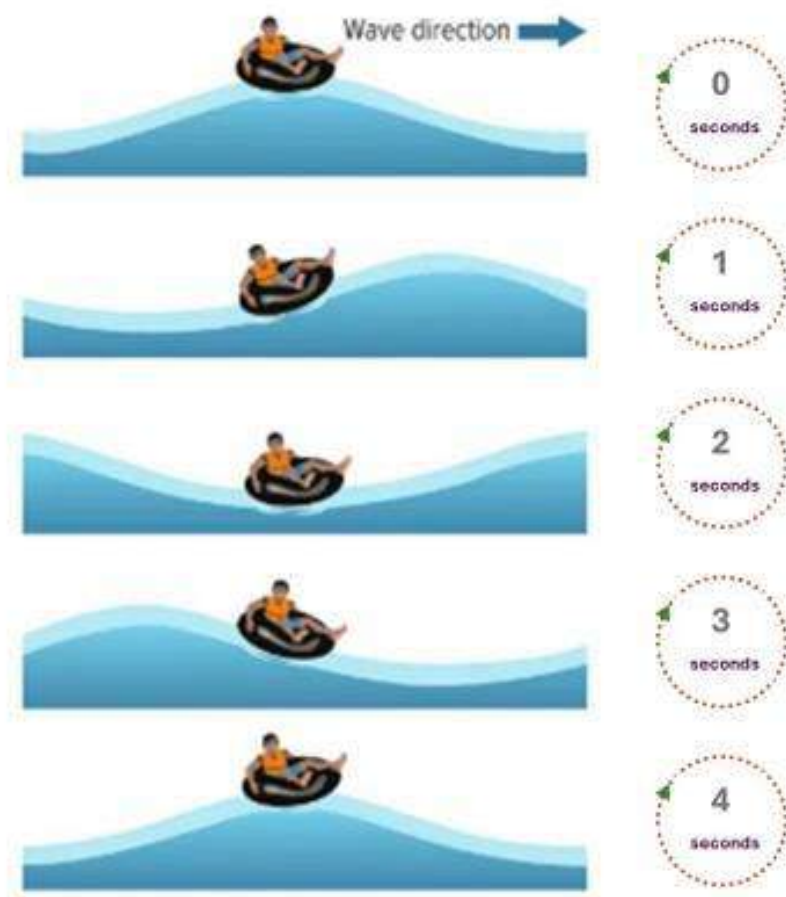
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### Question 2a

Based on the motion diagram provided, what is the frequency of the wave?



A) 0.25 Hz

B) 0.5 Hz

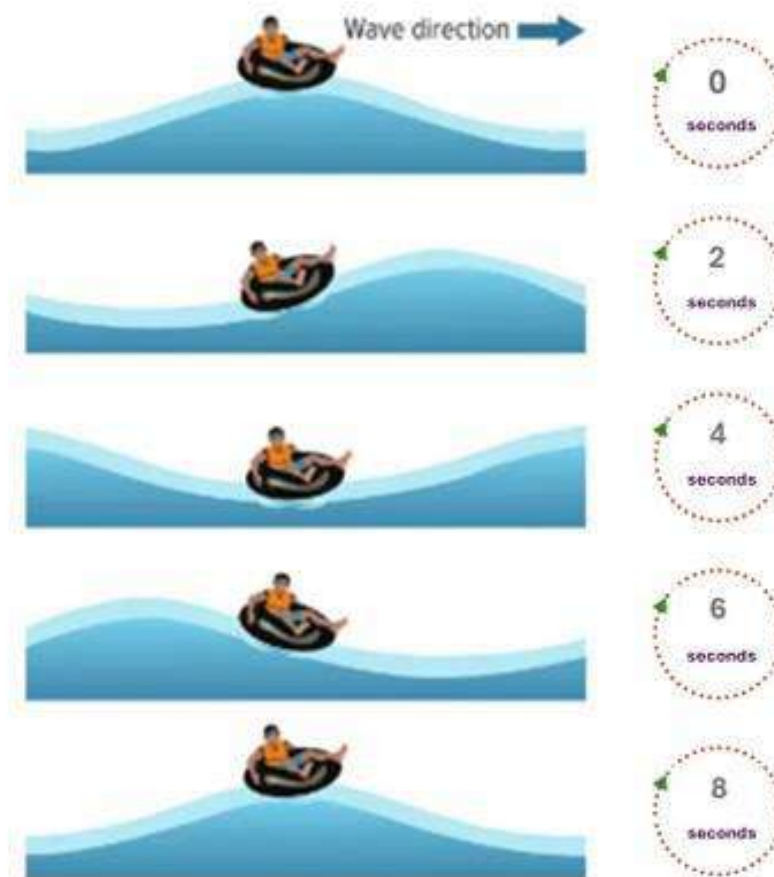
C) 2 Hz

D) 4 Hz

|   |   |
|---|---|
| A | B |
| C | D |

**Question 2b**

Based on the motion diagram provided, what is the frequency of the wave?



A) 0.125 Hz

B) 0.25 Hz

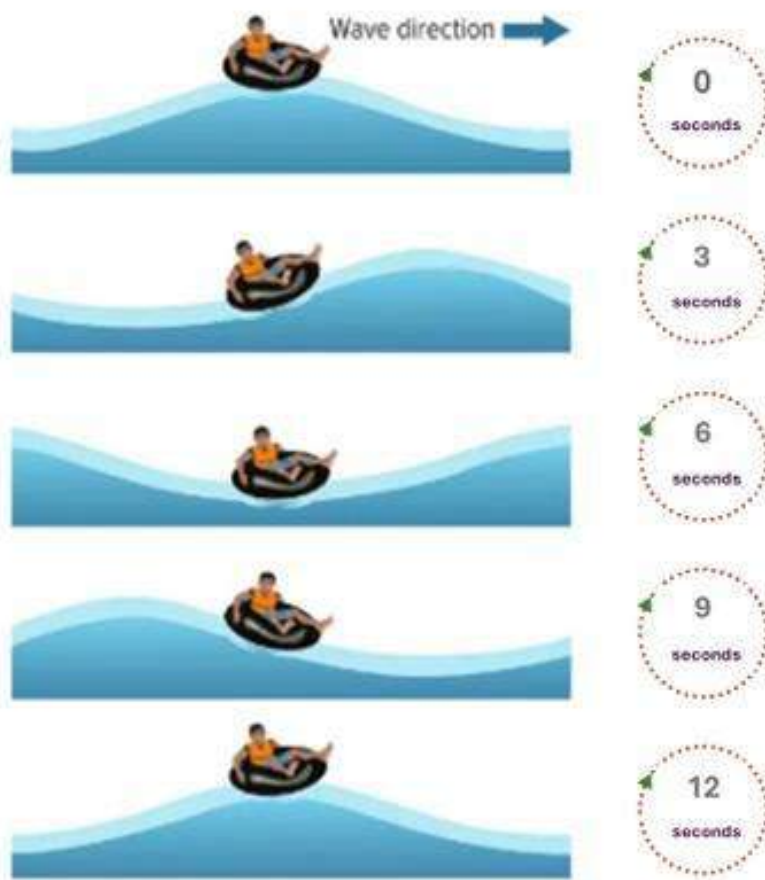
C) 4 Hz

D) 8 Hz

| A | B |
|---|---|
| C | D |

### Question 2c

Based on the motion diagram provided, what is the frequency of the wave?



A) 0.083 Hz

B) 0.125 Hz

C) 3 Hz

D) 12 Hz

|   |   |
|---|---|
| A | B |
| C | D |

Q3: Understand the relationship between sound properties and their physical causes, specifically that pitch is determined by frequency.  
(Unit:3, Page:30)

### الأسئلة الموضوعية - MCQ



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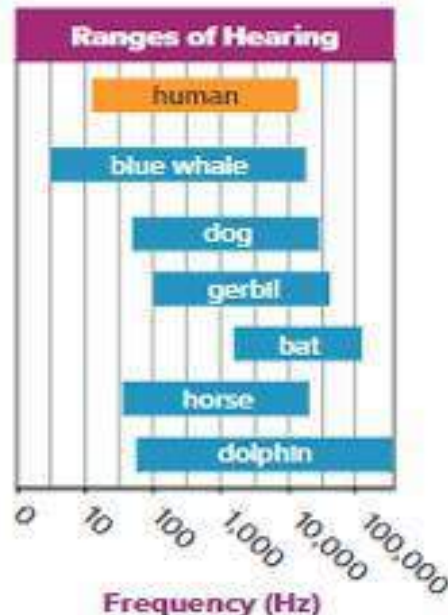
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### Question 3

**Pitch** The perception of how high or low a sound seems is **pitch**. In the Lab *Fever Pitch* you determined that the sound changed based on how long the string was and by how much force you applied. The length of the string changed the pitch and the frequency. Recall that frequency is the number of times the pattern repeats in a given amount of time. When talking about sound waves, frequency is often referred to as beats per second.

A higher frequency produces a higher pitch. For example, an adult male voice might range from 85 Hz to 155 Hz. An adult female voice might range from about 165 Hz to 255 Hz. Humans can hear thunder frequencies between 20 Hz and 120 Hz.

The human ear can detect sounds with frequencies between about 20 Hz and 20,000 Hz. Frequencies above this range are called ultrasound. The range of sounds heard by various animals is shown in figure to the right.



What is defined as the perception of how high or low a sound seems?

- A) Frequency
- B) Pitch
- C) Ultrasound
- D) Beats per second

|   |   |
|---|---|
| A | B |
| C | D |

When talking about sound waves, frequency is often referred to as:

- A) Length of the string
- B) Force applied
- C) Beats per second
- D) Ultrasound

|   |   |
|---|---|
| A | B |
| C | D |

Which of the following describes the relationship between frequency and pitch?

- A) A higher frequency produces a lower pitch.
- B) A higher frequency produces a higher pitch.
- C) Frequency changed but pitch remains the same.
- D) There is no relationship between frequency and pitch.

|   |   |
|---|---|
| A | B |
| C | D |

According to the text, what is the frequency range for an adult male voice?

- A) From about 165 Hz to 255 Hz
- B) Between 20 Hz and 120 Hz
- C) From 85 Hz to 155 Hz
- D) Between about 20 Hz and 20,000 Hz

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

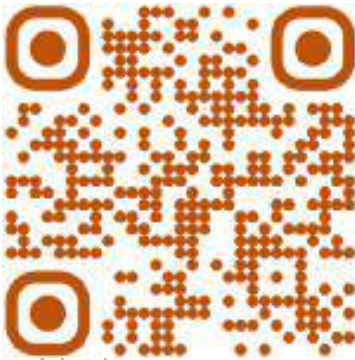
What frequencies of thunder can humans hear?

- A) Between 20 Hz and 120 Hz
- B) From 85 Hz to 155 Hz
- C) From about 165 Hz to 255 Hz
- D) Above 20,000 Hz

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

Q4: Understand wave properties by interpreting diagrams,  
including identifying amplitude as maximum displacement  
from equilibrium position.  
(Unit:3, Page:32)

### الأسئلة الموضوعية - MCQ



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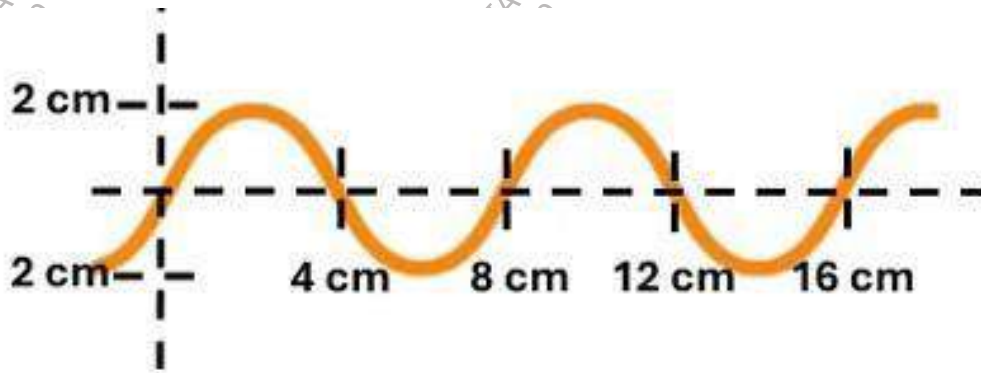
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**Question 4a**

**Determine the amplitude of the wave shown in the image below.**

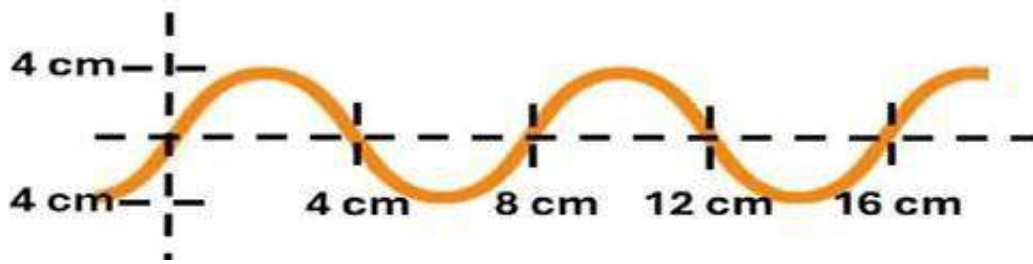


- A) 2 cm
- B) 4 cm
- C) 8 cm
- D) 16 cm

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

**Question 4b**

Determine the amplitude of the wave shown in the image below.



A) 16 cm

B) 12 cm

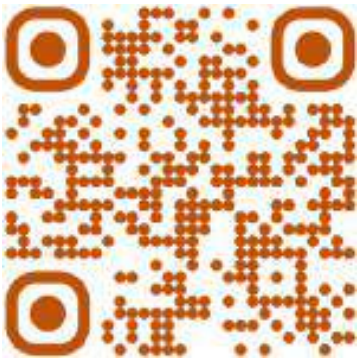
C) 8 cm

D) 4 cm

|   |   |
|---|---|
| A | B |
| C | D |

Q5: Understand that sound travels at different speeds through different media and compare the speed of sound in solids, liquids, and gases.  
(Unit:3, Page:47, 53)

### الأسئلة الموضوعية - MCQ



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### Question 5a

**Speed of Sound** In the Lab Echo, Echo you were able to calculate the speed of sound through air. Recall that for sound to be transmitted energy must pass from particle to particle. The material, or medium, that sound passes through affects how fast the sound moves. Two factors that influence the speed of sound waves are the density and the temperature of the medium.

Gas particles are far apart and collide less often than particles in a liquid or a solid. As shown in the table on the right, a gas takes longer to transfer sound energy between particles. In a solid where the particles are packed very close together, the particles collide and transfer energy very quickly. The more dense a medium, the faster sound will travel through it.

Particles move faster and collide more often as the temperature of a gas increases. This increase in the number of collisions transfers more energy in less time. Temperature has the opposite effect on liquids and solids. As liquids and solids cool, the molecules move closer together. They collide more often and transfer energy faster.

| The Speed of Sound |             |
|--------------------|-------------|
| Medium             | Speed (m/s) |
| Air (0°C)          | 331         |
| Air (20°C)         | 343         |
| Water (20°C)       | 1,481       |
| Water (0°C)        | 1,500       |
| Seawater (25°C)    | 1,533       |
| Ice (0°C)          | 3,500       |
| Iron               | 5,130       |
| Glass              | 5,640       |

For sound to be transmitted, energy must pass from:

- A) wave to wave
- B) particle to particle
- C) gas to liquid
- D) solid to vacuum

|   |   |
|---|---|
| A | B |
| C | D |

What two factors influence the speed of sound waves?

- A) Volume and pitch
- B) Frequency and amplitude
- C) Density and temperature of the medium
- D) Distance and echo time

|   |   |
|---|---|
| A | B |
| C | D |

In which type of medium do particles collide and transfer energy very quickly because they are packed very close together?

- A) A vacuum
- B) A gas
- C) A liquid
- D) A solid

|   |   |
|---|---|
| A | B |
| C | D |

**Question 5b**

**In which of the following, solid, liquid or gas, does sound travel the fastest?**

- A) Gas
- B) Liquid
- C) Solid
- D) Sound travels at the same speed in all of them

|   |   |
|---|---|
| A | B |
| C | D |

**Question 5c**

**In which of the following, solid, liquid or gas, does sound travel the slowest?**

- A) Solid
- B) Liquid
- C) Gas
- D) Sound travels at the same speed in all of them

|   |   |
|---|---|
| A | B |
| C | D |

**Question 5d**

In which of the following, air, water or iron, does sound travel the slowest?

- A) Iron
- B) Water
- C) Sound travels at the same speed in all of them
- D) Air

|   |   |
|---|---|
| A | B |
| C | D |

**Question 5e**

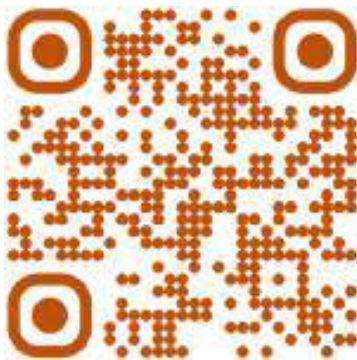
In which of the following, air, water or iron, does sound travel the slowest?

- A) Iron
- B) Water
- C) Air
- D) Sound travels at the same speed in all of them

|   |   |
|---|---|
| A | B |
| C | D |

Q6: Understand and analyze wave properties and relationships within the electromagnetic spectrum, including the inverse relationship between wavelength and frequency.  
(Unit:3, Page:70, 71, 83)

### الأسئلة الموضوعية - MCQ



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### Question 6a

Light is neither matter nor energy. Light is a type of wave. **Light** is electromagnetic radiation that you can see. Electromagnetic radiation is a type of wave created by vibrating particles. These waves radiate, or spread out, electric and magnetic fields in all directions from a source. You might recall that waves carry energy. The energy carried by an electromagnetic wave is called **radiant energy**.

There are many different types of electromagnetic waves. These waves are classified by their wavelengths and frequencies in the electromagnetic spectrum, as shown below. The groups include radio waves, microwaves, infrared waves, ultraviolet waves, X-rays, and gamma rays along with light. Out of the entire electromagnetic spectrum, light is the only wave that you can see with your eyes.

Which of the following statements correctly describes light based on the text?

- A) Light is a type of matter.
- B) Light is a type of wave that is neither matter nor energy.
- C) Light is pure energy but not a wave.
- D) Light is a combination of matter and energy.

|   |   |
|---|---|
| A | B |
| C | D |

What is electromagnetic radiation created by?

- A) Vibrating particles
- B) Sound echoes
- C) Dense gases
- D) Moving matter

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

What is the specific name given to the energy carried by an electromagnetic wave?

- A) Matter energy
- B) Sound energy
- C) Thermal energy
- D) Radiant energy

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

How are different types of electromagnetic waves classified in the electromagnetic spectrum?

- A) By their speed and density
- B) By their force and direction
- C) By their wavelengths and frequencies
- D) By their volume and pitch

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

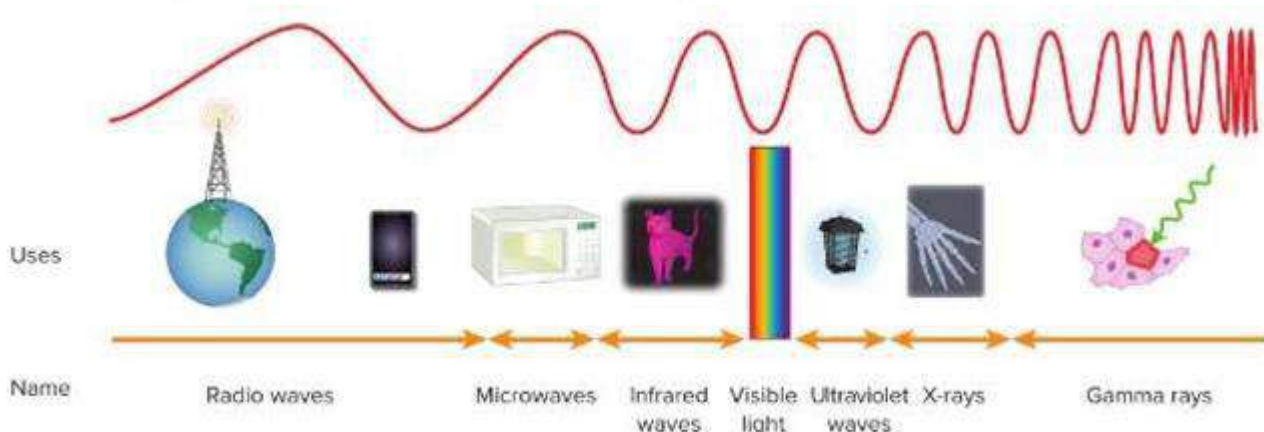
Out of the entire electromagnetic spectrum, which wave is the only one that humans can see with their eyes?

- A) Light
- B) X-rays
- C) Radio waves
- D) Infrared waves

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

**Question 6b**

**Based on the provided diagram, what is the correct sequence of waves arranged from lowest frequency to highest frequency?**



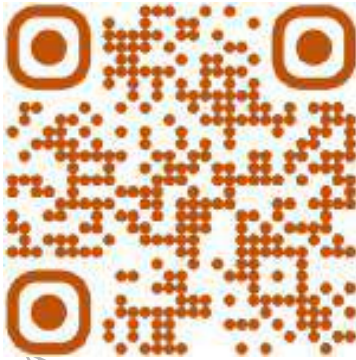
- A) Radio waves, Microwaves, Infrared waves, Visible light, Ultraviolet waves, X-rays, Gamma rays.
- B) Gamma rays, X-rays, Ultraviolet waves, Visible light, Infrared waves, Microwaves, Radio waves.
- C) Radio waves, Visible light, Microwaves, Infrared waves, Ultraviolet waves, Gamma rays, X-rays.
- D) Gamma rays, Ultraviolet waves, X-rays, Visible light, Infrared waves, Microwaves, Radio waves.

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

Q7: Understand the behavior of light during reflection and  
apply the law of reflection in plane surfaces.

(Unit:3, Page: 92)

### الأسئلة الموضوعية - MCQ



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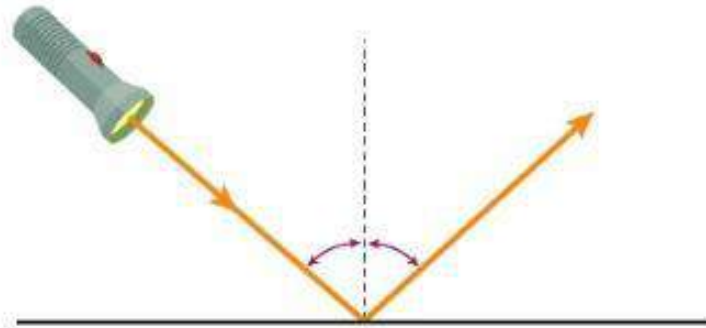
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**Question 7a**

Based on the provided diagram, which term correctly describes the light ray coming from the flashlight toward the surface?

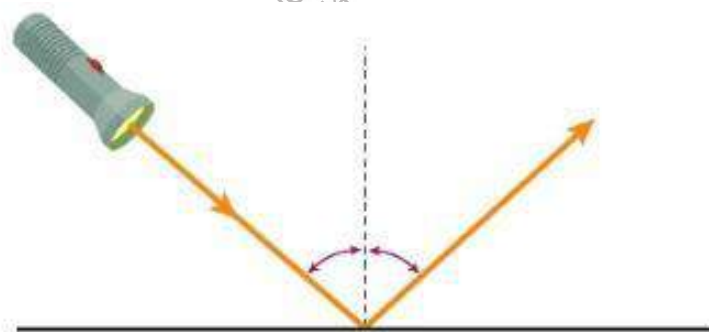


- A) Reflected ray
- B) Incident ray
- C) Normal line
- D) Refracted ray

|   |   |
|---|---|
| A | B |
| C | D |

**Question 7b**

Based on the provided diagram, what does the dashed vertical line perpendicular to the reflecting surface represent?

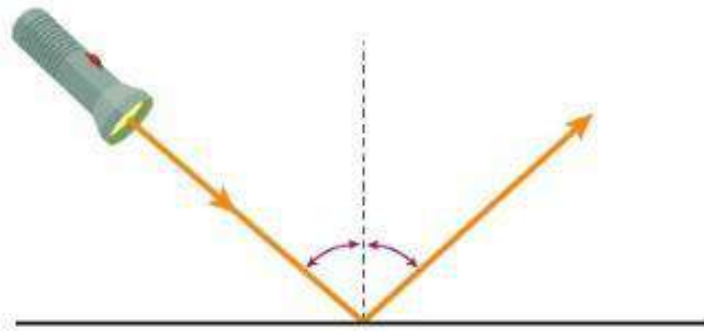


- A) Reflected ray
- B) Incident ray
- C) Normal
- D) Absorbed ray

|   |   |
|---|---|
| A | B |
| C | D |

**Question 7c**

According to the law of reflection shown in the diagram, what is the relationship between the angle of incidence and the angle of reflection?

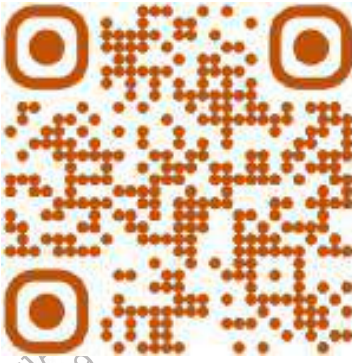


- A) The angle of incidence is equal to the angle of reflection.
- B) The angle of incidence is twice the angle of reflection.
- C) The angle of incidence is always smaller than the angle of reflection.
- D) There is no constant relationship between the two angles.

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

Q8: Understand how light reflects from different surfaces  
and distinguish between regular and diffuse  
reflection. (Unit:3, Page: 100,103)

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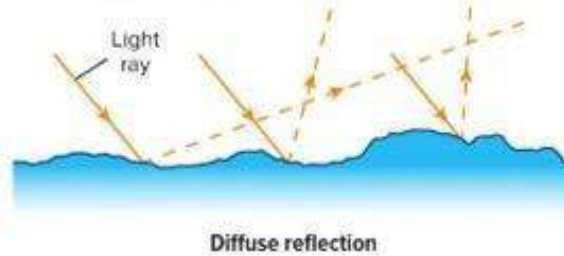
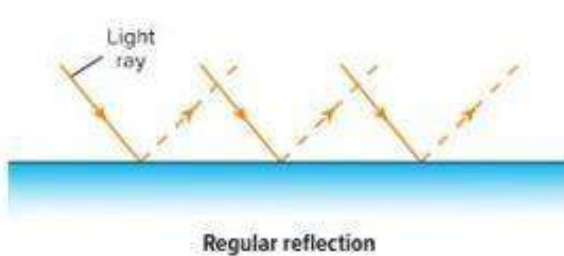
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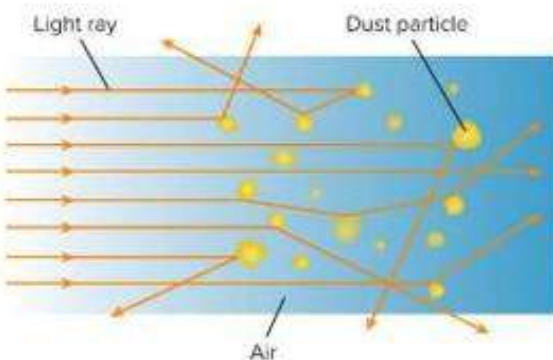
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## Question 8

**Regular and Diffuse Reflection** You see objects when light reflects off them into your eyes. Why can you see your reflection in smooth, shiny surfaces but not in a piece of paper or a painted wall? The law of reflection applies whether the surface is smooth or rough. Reflection of light from a smooth, shiny surface is called **regular reflection**. Look at the figure on the left below. The three incident rays and the three reflected rays all are parallel. You see a sharp image when parallel rays reflect into your eyes. When light strikes an uneven surface, as shown on the right below, the angle of reflection still equals the angle of incidence at each point. However, rays reflect in different directions. Reflection of light from a rough surface is called **diffuse reflection**.



**Scattering** When a beam of sunlight shines through a window, you might notice tiny particles of dust. You see the dust particles because they reflect light waves. As the figure below shows, dust particles reflect light waves in many different directions because they have different shapes. This is an example of scattering.



Scattering occurs when light waves traveling in one direction are made to travel in many directions. The dust particles scatter the light waves in a sunbeam. If there are enough particles in the air, all of the light will be scattered. When this happens, no light will be transmitted. This is why clouds and fog are opaque. The water particles in the air reflect light. All the Sun's light is scattered, so the cloud appears opaque:

What is the reflection of light from a smooth, shiny surface called?

- A) Diffuse reflection
- B) Scattering
- C) Regular reflection
- D) Transmission

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

According to the text, when does the law of reflection apply?

- A) Only when the surface is smooth
- B) Whether the surface is smooth or rough
- C) Only when light strikes an uneven surface
- D) Only during scattering

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

What type of image do you see when parallel light rays reflect into your eyes?

- A) A sharp image
- B) A blurry image
- C) No image at all
- D) A scattered image

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

When light strikes an uneven surface, how does the angle of reflection compare to the angle of incidence at each point?

- A) The angle of reflection is greater than the angle of incidence
- B) The angle of reflection is less than the angle of incidence
- C) The angle of reflection still equals the angle of incidence
- D) The angles change randomly and never equal each other

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

Why do dust particles reflect light waves in many different directions?

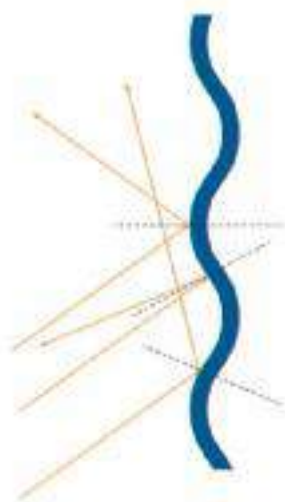
- A) Because they are smooth and shiny
- B) Because they have different shapes
- C) Because they absorb all light waves
- D) Because they travel in one direction

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

Which object has a surface structure that reflects light rays in the functional manner shown in the model above?

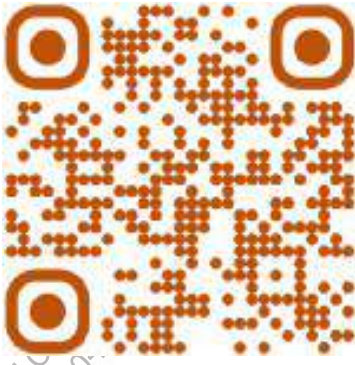
- A convex mirror
- B glass window
- C polished silver spoon
- D pond with ripples

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |



Q9: Apply understanding of refraction to predict the path of light when it passes between materials with different refractive indices. (Unit:3, Page: 112,113)

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**Question 9a**

The table below lists the index of refraction for air (1.0003), water (1.33), and diamond (2.47). When a ray of light passes from diamond into air, which path will the refracted ray take?

| Medium  | Index of Refraction |
|---------|---------------------|
| Air     | 1.0003              |
| Water   | 1.33                |
| Diamond | 2.47                |

- A) It will bend toward the normal.
- B) It will continue straight ahead.
- C) It will stop at the boundary surface.
- D) It will bend away from the normal.

|   |   |
|---|---|
| A | B |
| C | D |

**Question 9b**

The table below lists the index of refraction for air (1.0003), water (1.33), and diamond (2.47). When a ray of light passes from air into diamond, which path will the refracted ray take?

| Medium  | Index of Refraction |
|---------|---------------------|
| Air     | 1.0003              |
| Water   | 1.33                |
| Diamond | 2.47                |

- A) It will bend away from the normal line.
- B) It will bend toward the normal line.
- C) It will reflect off the surface and stay in the air.
- D) It will continue straight without any deviation.

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

### Question 9c

The table below lists the index of refraction for air (1.0003), water (1.33), and diamond (2.47). When a ray of light passes from diamond into water, which path will the refracted ray take?

| Medium  | Index of Refraction |
|---------|---------------------|
| Air     | 1.0003              |
| Water   | 1.33                |
| Diamond | 2.47                |

- A) It will bend toward the normal.
- B) It will continue in a straight line.
- C) It will bend away from the normal.
- D) It will stop completely at the boundary.

|   |   |
|---|---|
| A | B |
| C | D |

**Question 9d**

The table below lists the index of refraction for air (1.0003), water (1.33), and diamond (2.47). When a ray of light passes from water into air, which path will the refracted ray take?

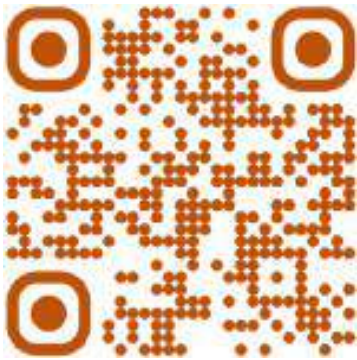
| Medium  | Index of Refraction |
|---------|---------------------|
| Air     | 1.0003              |
| Water   | 1.33                |
| Diamond | 2.47                |

- A) It will bend away from the normal because it enters a medium with a lower index of refraction.
- B) It will bend toward the normal because it enters a medium with a higher index of refraction.
- C) It will continue in a straight line without changing its direction.
- D) It will reflect completely back into the water at the same angle.

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

Q10: Understand image formation by convex lenses and determine the characteristics of images formed using ray diagrams. (Unit:3, Page: 116,118)

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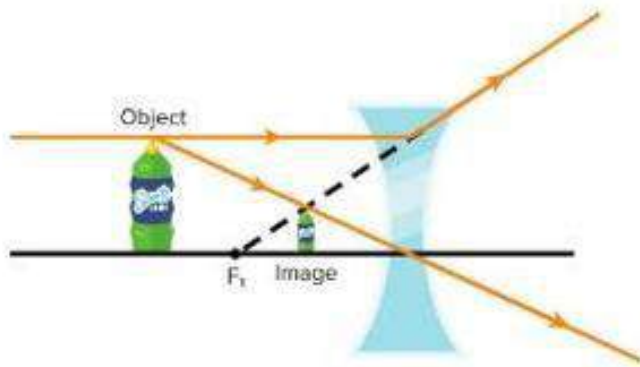
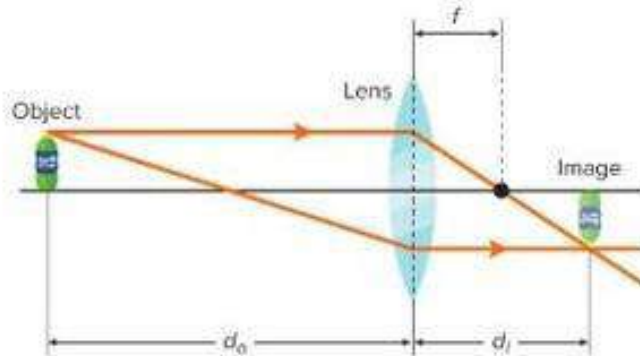
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### Question 10

**Focal Point and Focal Length** Similar to a mirror, the point where rays parallel to the optical axis converge after passing through a lens is the focal point. The distance along the optical axis between the lens and the focal point is the focal length of the lens. Because you can look through a lens from either side, a focal point is on both sides of the lens. For a lens with the same curve on both sides, the lens's two focal points are the same distance from it.

**Types of Images** Like a concave mirror, the type of image a convex lens forms depends on the location of the object. A convex lens can form both real and virtual images. The diagrams show only two rays, but remember that in reality, there are an infinite number of rays.

If you look through a magnifying lens at an object more than one focal length from the lens, the image you see is inverted and smaller. If you look at an object less than one focal length from the lens, the image you see is upright and larger. The image is virtual because your brain interprets the rays as moving in a straight line.



What is the point where rays parallel to the optical axis converge after passing through a lens called?

- A) The optical axis
- B) The focal length
- C) The focal point
- D) The virtual image

|   |   |
|---|---|
| A | B |
| C | D |

What distance defines the focal length of a lens?

- A) The distance between the object and the lens
- B) The distance along the optical axis between the lens and the focal point
- C) The distance between the lens and the real image
- D) The distance between the two focal points on either side

|   |   |
|---|---|
| A | B |
| C | D |

For a lens with the same curve on both sides, what is true about its two focal points?

- A) They are at different distances from the lens.
- B) They are on the same side of the lens.
- C) They are the same distance from it.
- D) They only exist when an object is present.

|   |   |
|---|---|
| A | B |
| C | D |

What determines the type of image that a convex lens forms?

- A) The number of rays passing through it
- B) The location of the object
- C) The thickness of the lens center
- D) The curve on only one side of the lens

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

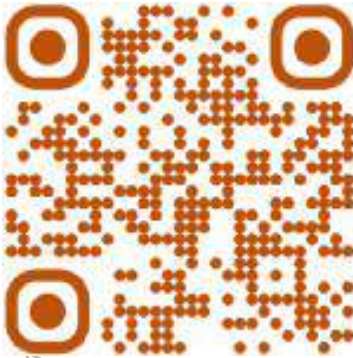
What types of images can a convex lens form?

- A) Only real images
- B) Only virtual images
- C) Both real and virtual images
- D) No images at all

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

Q11: Understand image formation by convex lenses and determine the characteristics of images formed using ray diagrams. (Unit:3, Page: 117,121)

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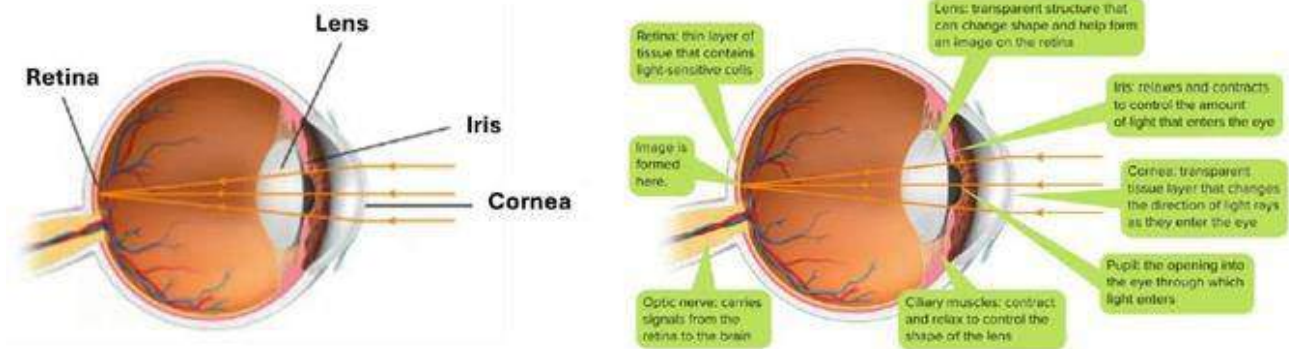
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**Question 11a**

**Which part of the eye can change its structure (shape) to form a focused image?**

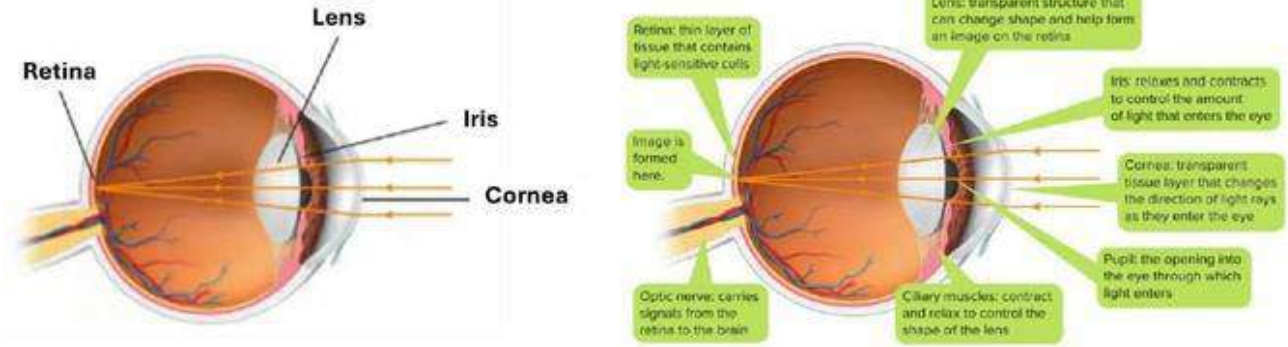


- A) Cornea
- B) Iris
- C) Lens
- D) Retina

|   |   |
|---|---|
| A | B |
| C | D |

**Question 11b**

**On which part of the eye is an image formed?**

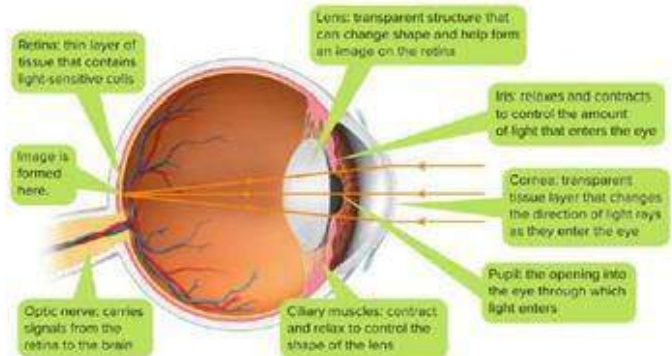
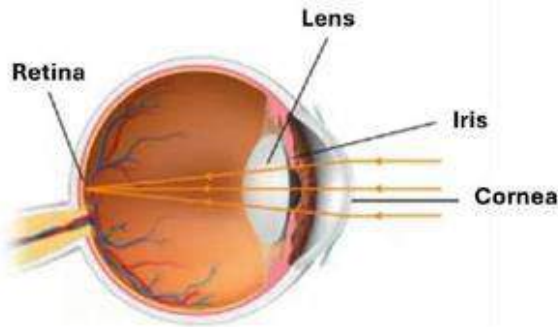


- A) Cornea
- B) Iris
- C) Lens
- D) Retina

|   |   |
|---|---|
| A | B |
| C | D |

**Question 11c**

**Which part of the eye relaxes and contracts to control the amount of light that enters the eye?**



A) Cornea

B) Iris

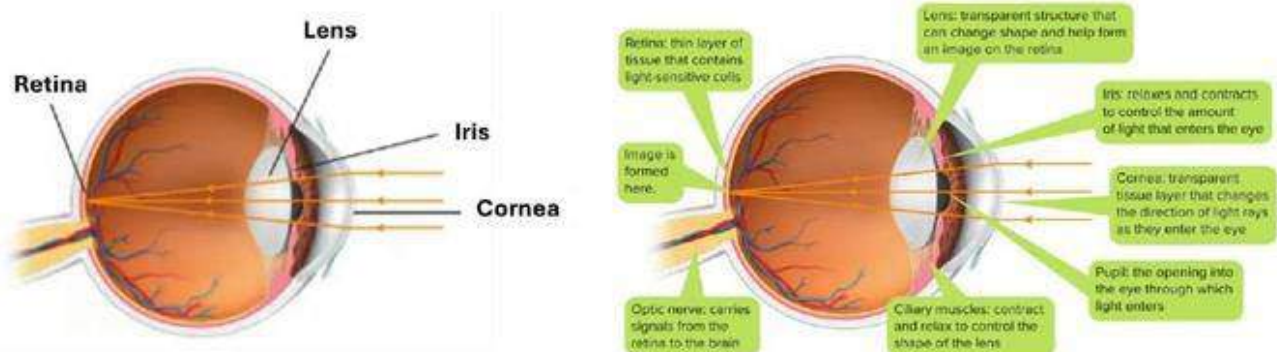
C) Lens

D) Retina

|   |   |
|---|---|
| A | B |
| C | D |

### Question 11d

Which part of the eye is a transparent tissue layer that changes the direction of light rays as they enter the eye?



A) Cornea

B) Iris

C) Lens

D) Retina

|   |   |
|---|---|
| A | B |
| C | D |

Q12: Understand how light interacts with transparent media  
to produce phenomena such as refraction and color  
separation in natural events like rainbows.

(Unit:3, Page: 131,132,141)

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### Question 12a

**Separating Colors of Light** In the Lab *Rainbow Bright*, you learned that white light is made up of different colors. Recall that each color has a different range of wavelengths and frequencies. Waves with longer wavelengths and higher frequencies travel at greater speeds in a medium than waves with shorter wavelengths and lower frequencies. Therefore, when entering a medium, light with lower frequencies travels faster and refracts less than light with higher frequencies. Violet wavelengths refract the most because their frequencies are the highest. Red wavelengths have the lowest frequencies and refract the least. This causes the colors of light to spread out when they are refracted through a prism.



According to the text, what is white light made up of?

- A) Only violet and red light
- B) Different colors
- C) Waves with the same wavelength
- D) A single frequency

|   |   |
|---|---|
| A | B |
| C | D |

How do waves with longer wavelengths and higher frequencies travel in a medium compared to waves with shorter wavelengths and lower frequencies?

- A) They travel at greater speeds.
- B) They travel at lower speeds.
- C) They travel at the exact same speed.
- D) They stop traveling completely.

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

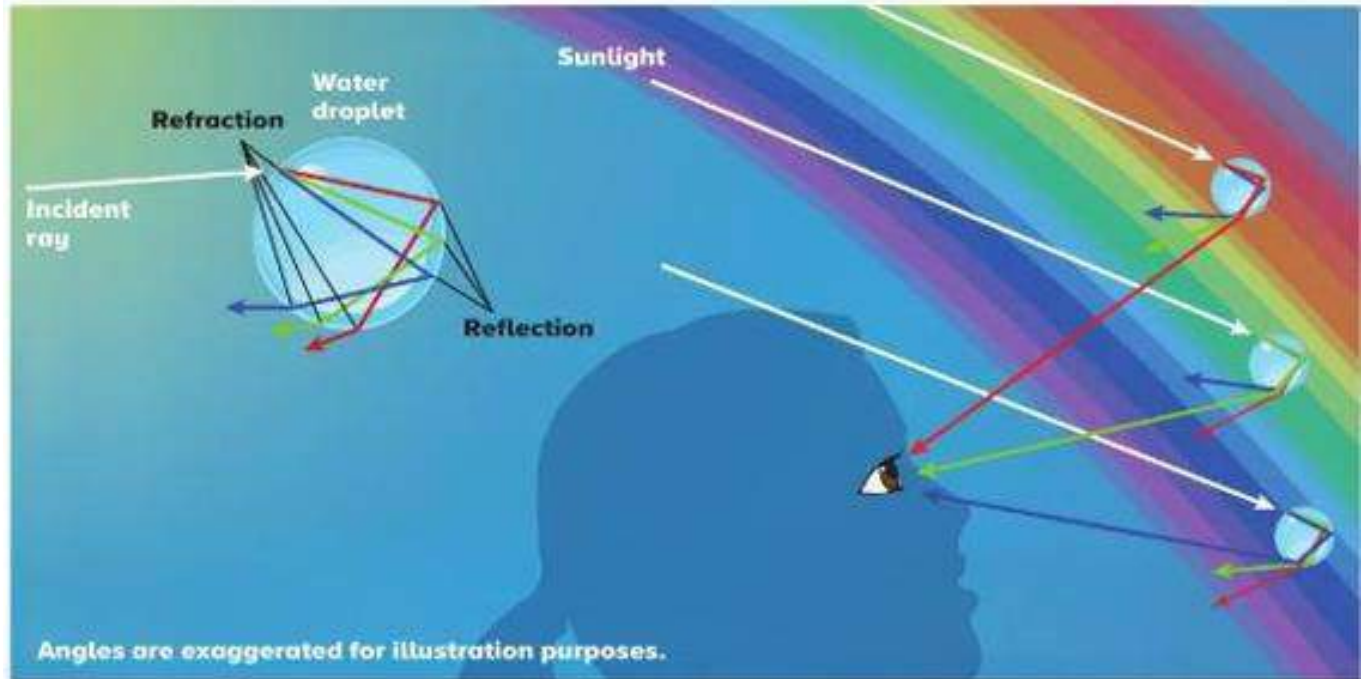
When entering a medium, how does light with lower frequencies behave compared to light with higher frequencies?

- A) It travels slower and refracts more.
- B) It travels faster and refracts less.
- C) It travels faster and refracts more.
- D) It travels slower and refracts less.

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

### Question 12b

**EARTH SCIENCE Connection** You may have noticed that when a prism refracts the colors of light, they appear in the same order as in a rainbow. Do rainbows in nature come from a prism? You may have seen a rainbow appear in the sky during or after a rain shower. Rainbows form when water droplets in the air function like prisms and refract light. Each wavelength of light refracts as it enters the droplet, reflects back into the droplet, and refracts again when it leaves the droplet. Notice in the figure below that wavelengths of light near the blue end of the spectrum refract more than wavelengths near the red end of the spectrum. This effect produces the separate colors you see in a rainbow.



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When a prism refracts the colors of light, in what order do they appear?

- A) In a completely random order
- B) In the same order as in a rainbow
- C) In reverse order of a rainbow
- D) They do not appear in any order because they mix

|   |   |
|---|---|
| A | B |
| C | D |

According to the text, what functions like prisms to refract light and form rainbows in nature?

- A) Particles of dust
- B) Water droplets in the air
- C) Glass windows
- D) Crystals in the sky

|   |   |
|---|---|
| A | B |
| C | D |

What is the correct sequence of events when each wavelength of light enters a water droplet?

- A) It reflects, refracts as it enters, and reflects again as it leaves.
- B) It refracts as it enters, reflects back into the droplet, and refracts again when it leaves.
- C) It passes straight through without refracting or reflecting.
- D) It reflects off the outer surface and never enters the droplet.

|   |   |
|---|---|
| A | B |
| C | D |

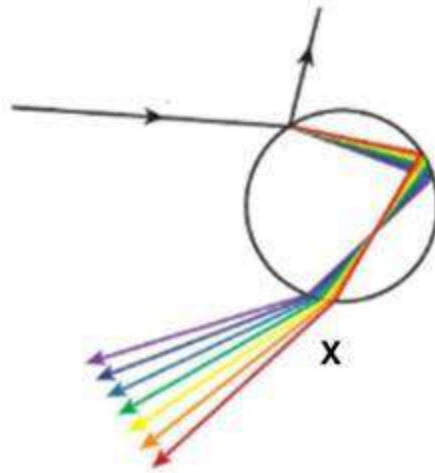
Which wavelengths of light refract more inside a water droplet?

- A) Wavelengths near the red end of the spectrum
- B) Wavelengths near the blue end of the spectrum
- C) All wavelengths refract exactly the same amount
- D) None of the wavelengths refract inside the droplet

|   |   |
|---|---|
| A | B |
| C | D |

**Question 12b**

**What causes the spread of colors at point X as the light rays leave the water droplet?**

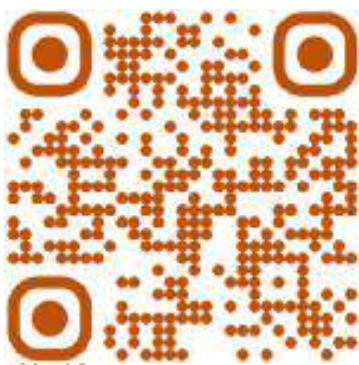


- A) Absorption of specific wavelengths of light by the water droplet.
- B) Regular reflection of light waves off the inner back surface of the droplet.
- C) Diffuse reflection caused by the uneven surface structure of point X.
- D) Refraction of different wavelengths of light at different angles as they exit the droplet.

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

Q13: Understand how objects interact with light, including reflection and absorption, to explain the observed color of objects. (Unit:3, Page: 136,141)

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**Question 13a**

**What color of light does the ball reflect so that it appears red?**



- A) Blue
- B) Green
- C) Red
- D) Yellow

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

**Question 13b**

**What color of light does the ball reflect so that it appears blue?**



- A) Blue
- B) Red
- C) White
- D) Green

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

**Question 13c**

**What color of light does the ball reflect so that it appears green?**

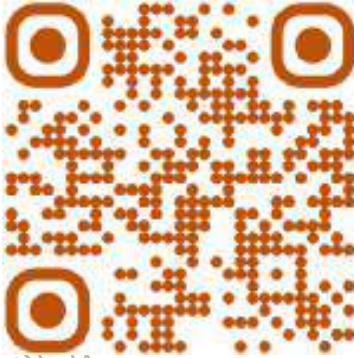


- A) Blue
- B) Red
- C) White
- D) Green

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

Q14: Understand key ecological terminology related to  
populations and species distribution within ecosystems.  
(Unit:4, Page: 10)

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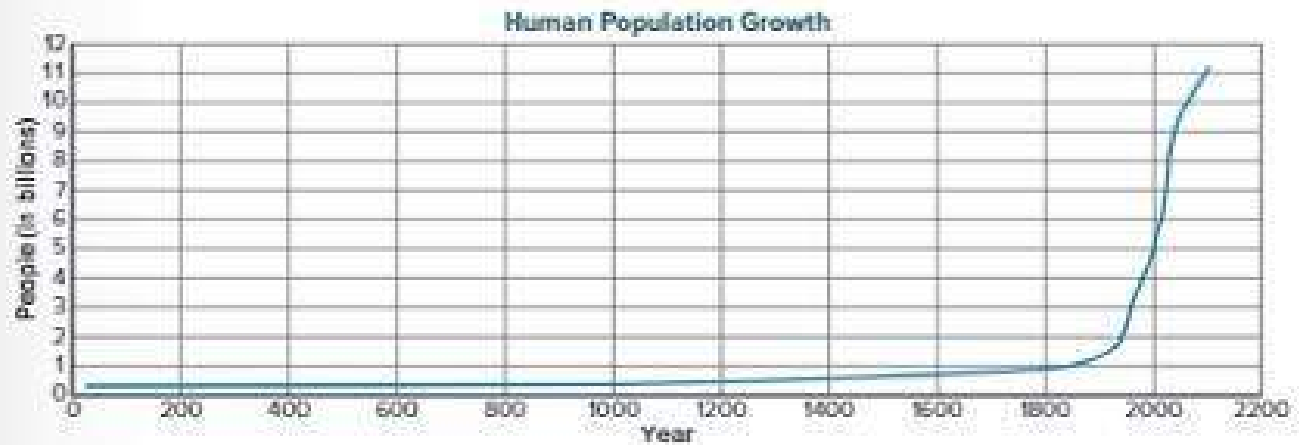


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### Question 14

#### Here We Grow Again

Analyze the information presented in the graph.



Based on the graph, what units are used to measure the number of people on the vertical axis (y-axis)?

- A) Millions
- B) Billions
- C) Thousands
- D) Trillions

|   |   |
|---|---|
| A | B |
| C | D |

How did the human population increase between the years 200 and 1800 according to the text?

- A) It rose sharply.
- B) It decreased dramatically.
- C) It increased steadily at a slow rate.
- D) It remained completely unchanged at zero.

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

According to the graph, around which year does the human population growth curve begin to steepen drastically upward?

- A) Year 400
- B) Year 800
- C) Year 1200
- D) After Year 1800

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

Q15: Understand key demographic terms related to population growth and describe patterns of rapid population increase. (Unit:4, Page: 10)

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### Question 15

## How fast is the population growing?

You are part of a population of humans. The other species in your area, such as birds or trees, each make up a separate population. A **population** is all the members of a species living in a given area. How has human population changed over time? Let's investigate.



According to the text, what is the definition of a population?

- A) All the different species living anywhere in the world.
- B) All the members of a species living in a given area.
- C) The total number of trees and birds in a specific city.
- D) A group of humans traveling over time to different areas.

|   |   |
|---|---|
| A | B |
| C | D |

The text states that other species in your area, such as birds or trees, each make up what?

- A) A single unified population with humans
- B) A separate population
- C) A temporary ecosystem
- D) An unmeasurable group

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

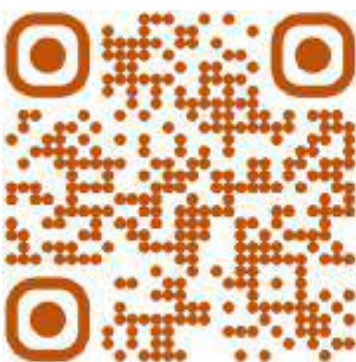
What type of population are you a part of, as mentioned in the text?

- A) A population of birds
- B) A population of trees
- C) A population of humans
- D) A combined population of all species

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

Q16: Interpret population data using age structure  
diagrams to classify types of human population growth.  
(Unit:4, Page: 13,14)

### الأسئلة الموضوعية - MCQ

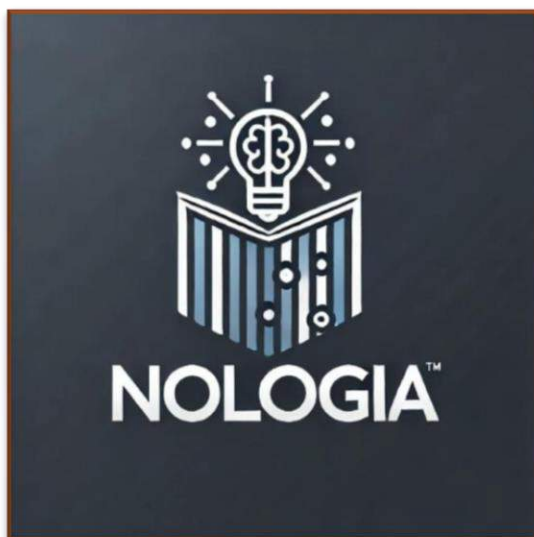


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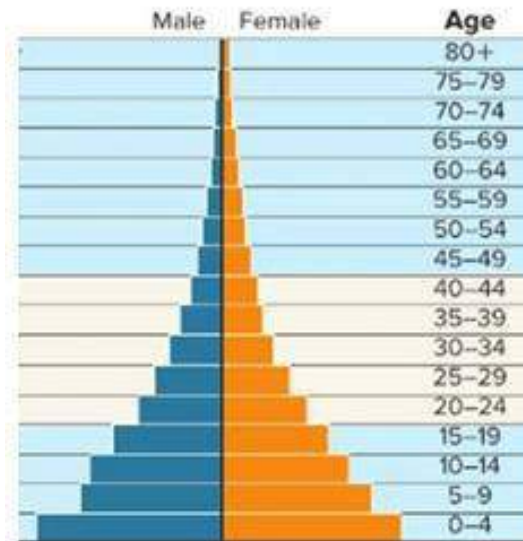
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**Question 16a**

What type of human population growth, rapid, slow or negative, does the age structure below represent?

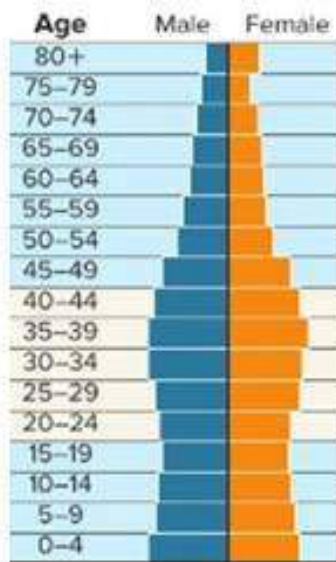


- A) Slow growth
- B) Negative growth
- C) Rapid growth
- D) Zero growth

|   |   |
|---|---|
| A | B |
| C | D |

### Question 16b

What type of human population growth, rapid, slow or negative, does the age structure below represent?

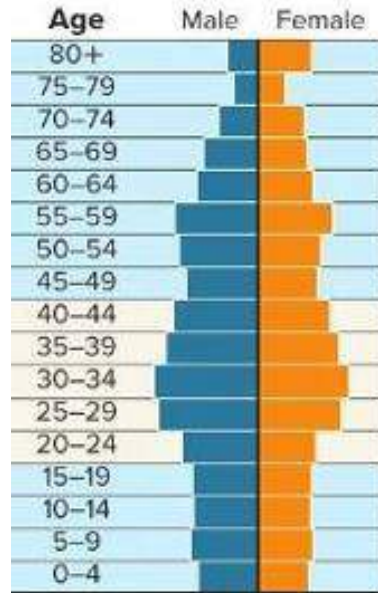


- A) Slow growth
- B) Rapid growth
- C) Negative growth
- D) Exponential growth

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

**Question 16c**

What type of human population growth, rapid, slow or negative, does the age structure below represent?



- A) Rapid growth
- B) Slow growth
- C) Stable growth
- D) Negative growth

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

Q17: Analyze population data to compare population growth rates across countries using quantitative information. (Unit:4, Page: 13,14,21)

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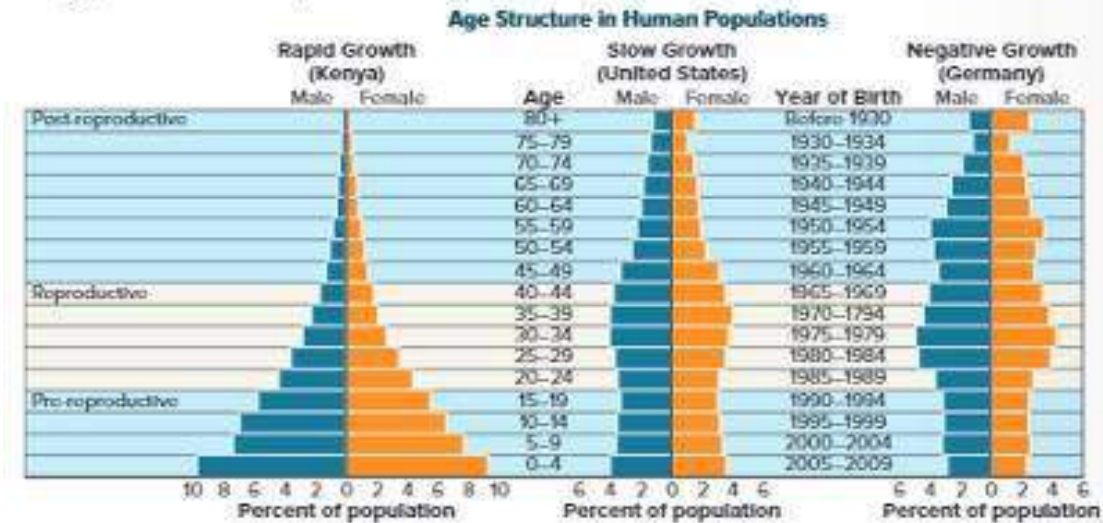


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### Question 17a

#### Increasing and Decreasing Populations

The diagram below shows the relative numbers of individuals in pre-reproductive, reproductive, and post-reproductive years for three countries: Kenya, the United States, and Germany.



What is the reflection of light from a smooth, shiny surface called?

- A) Diffuse reflection
- B) Scattering
- C) Regular reflection
- D) Transmission

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

According to the text, when does the law of reflection apply?

- A) Only when the surface is smooth
- B) Whether the surface is smooth or rough
- C) Only when light strikes an uneven surface
- D) Only during scattering

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

What type of image do you see when parallel light rays reflect into your eyes?

- A) A sharp image
- B) A blurry image
- C) No image at all
- D) A scattered image

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

When light strikes an uneven surface, how does the angle of reflection compare to the angle of incidence at each point?

- A) The angle of reflection is greater than the angle of incidence
- B) The angle of reflection is less than the angle of incidence
- C) The angle of reflection still equals the angle of incidence
- D) The angles change randomly and never equal each other

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

Why do dust particles reflect light waves in many different directions?

- A) Because they are smooth and shiny
- B) Because they have different shapes
- C) Because they absorb all light waves
- D) Because they travel in one direction

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

**Question 17b**

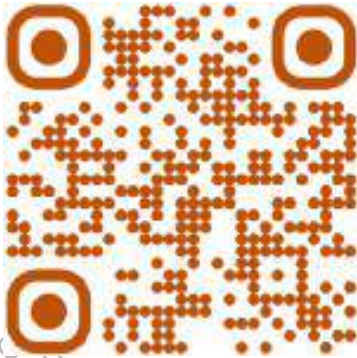
**What can you determine about population growth rates from observing the top halves of the three charts?**

- A) Growth rates accelerate when a smaller proportion of the population is in the upper part of the chart.
- B) Growth rates slow as a greater proportion of the population is in the upper part of the chart.
- C) Growth rates remain entirely constant regardless of the proportion in the upper part of the chart.
- D) Growth rates turn negative only when the lower part of the chart is wider than the top half.

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

Q18: Understand key ecological concepts related to population sustainability, including carrying capacity and environmental limits. (Unit:4, Page: 17)

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### Question 18

**Population Limits** As the human population grows larger and larger, cities become crowded with people, using space and depleting resources. Earth has limited resources. It cannot support a population of any species in a given environment beyond its carrying capacity. **Carrying capacity** is the largest number of individuals of a given species that Earth's resources can support and maintain for a long period of time. Let's explore carrying capacity.



According to the text, what happens to cities as the human population grows larger and larger?

- A) They become more organized and structured.
- B) They become crowded with people, using space and depleting resources. 29
- C) They decrease in size and expand into rural areas.
- D) They stop using Earth's limited resources.

|   |   |
|---|---|
| A | B |
| C | D |

What is stated in the image regarding Earth's resources?

- A) Earth has unlimited resources for all species.
- B) Earth's resources are only available to humans.
- C) Earth has limited resources.
- D) Earth can support any population size indefinitely.

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

Earth cannot support a population of any species in a given environment beyond its \_\_\_\_\_.

- A) growth rate
- B) space limitations
- C) human population
- D) carrying capacity

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

Q19: Analyze and interpret graphical data to compare land use categories and understand proportional relationships in human geography. (Unit:4, Page: 33)

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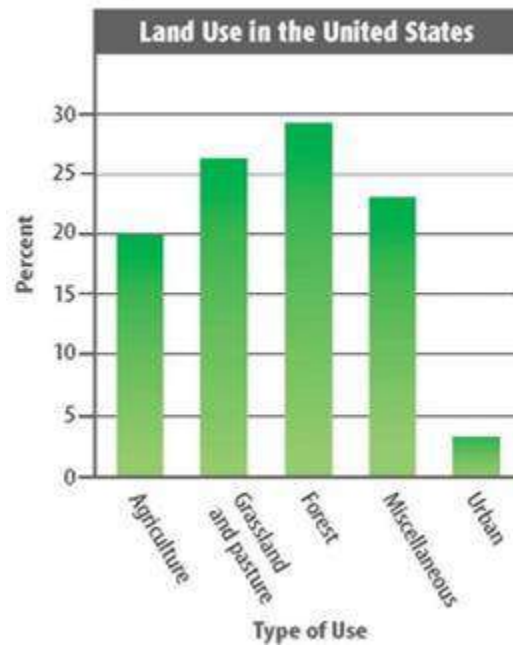
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**Question 19a**

**Which category had the highest land use?**

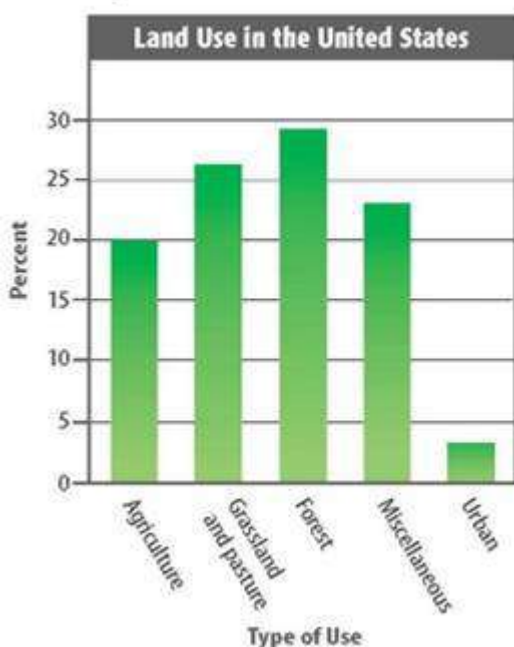


- A) Forest
- B) Grassland and pasture
- C) Miscellaneous
- D) Agriculture

|   |   |
|---|---|
| A | B |
| C | D |

### Question 19b

Which types of land use were 20% or lower?

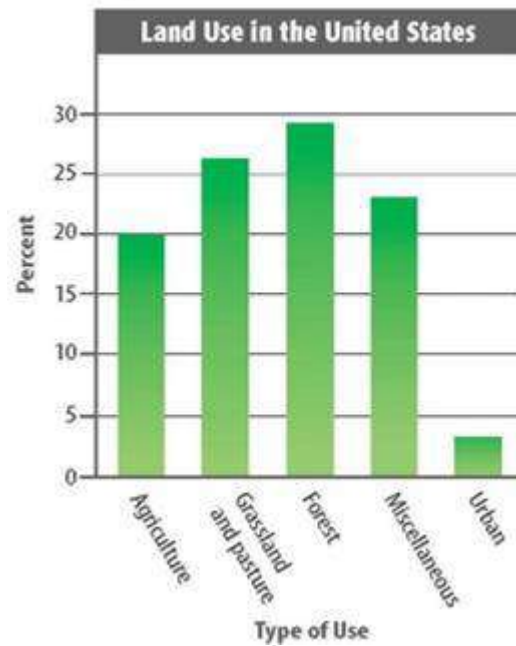


- A) Grassland and pasture, Forest
- B) Miscellaneous, Urban
- C) Agriculture, Urban
- D) Forest, Miscellaneous

|   |   |
|---|---|
| A | B |
| C | D |

**Question 19c**

Which category had the lowest percentage of land use? the highest land use?



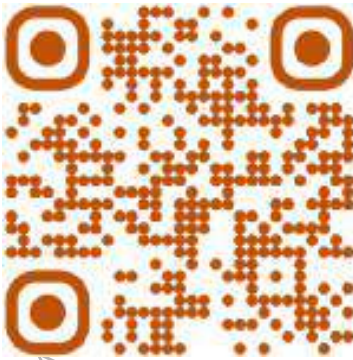
- A) Agriculture
- B) Urban
- C) Miscellaneous
- D) Forest

|   |   |
|---|---|
| A | B |
| C | D |

Q20: Use real-world data to calculate percentage increase  
and/or percentage decrease in quantities.

(Unit:4, Page: 32)

### الأسئلة الموضوعية - MCQ



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**Question 20**

## Why cut down trees?

Many experts are concerned about the loss of forest cover worldwide. The removal of large areas of forests for human purposes is called **deforestation**. Why do humans cut down trees?

In 1630 at the beginning of European settlement, about 425,000,000 hectares of the United States were forested. By 2017, the area of forested land had declined to 300,000,000 hectares. What is the percent decrease of forested land between 1630 and 2017?

- A) 42% decrease
- B) 29% decrease
- C) 12.5% decrease
- D) 71% decrease

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

The population of the United States in 1630 was around 4,500. In 2017, the population was around 326,500,000. What percent increase does this represent?

- A) 72,554% increase
- B) 326,495% increase
- C) 4,500,000% increase
- D) 7,255,455% increase

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

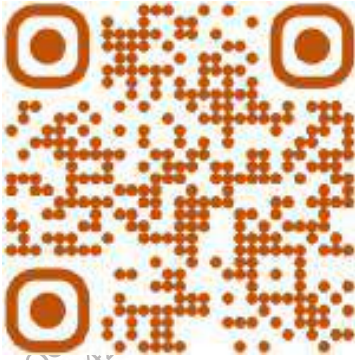
What cause-and-effect relationship can you identify between the removal of forests and human population growth?

- A) An increase in the size of the human population has caused an increase in deforestation and a decrease in forests.
- B) A decrease in the human population has led to a major loss of forested land.
- C) The removal of forests has allowed the human population to decrease significantly.
- D) There is no visible cause-and-effect relationship between population growth and forest size.

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

Q21: Understand actions can increase or decrease the ecological footprint on the environment. (Unit:4, Page: 40)

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### Question 21

**Changes in Earth's Systems** The consumption of natural resources, like trees and land, has environmental effects of global importance. Forest clearing for cropland and pasture diminishes habitat. Habitat loss is often the greatest extinction threat for the biosphere.

Clearing forests can also affect the geosphere and hydrosphere. Plant roots hold soil in place. Without these natural anchors, soil erodes away. Drought can also follow deforestation. Cleared land dries rapidly and stores little moisture.

And finally, deforestation also impacts the atmosphere. Trees remove carbon dioxide from the atmosphere during photosynthesis. Rates of photosynthesis decrease when large areas of trees are cut down, and more carbon dioxide remains in the atmosphere.



According to the text, what is often the greatest extinction threat for the biosphere?

- A) Increased photosynthesis rates
- B) The consumption of cropland
- C) Habitat loss
- D) Soil erosion

|   |   |
|---|---|
| A | B |
| C | D |

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What can happen to the soil when forests are cleared, removing the plant roots that act as natural anchors?

- A) Soil erodes away.
- B) Soil stores extra moisture.
- C) Soil becomes geosphere resistant.
- D) Soil stops drought completely.

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

Why can drought follow deforestation according to the text?

- A) Because trees release carbon dioxide into the biosphere.
- B) Because plant roots hold too much water in place.
- C) Because the geosphere and hydrosphere disappear entirely.
- D) Because cleared land dries rapidly and stores little moisture.

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

What impact does cutting down large areas of trees have on the atmosphere?

- A) Rates of photosynthesis increase, removing more carbon dioxide.
- B) Rates of photosynthesis decrease, and more carbon dioxide remains in the atmosphere.
- C) Trees begin to produce carbon dioxide instead of oxygen.
- D) The atmosphere completely stops interacting with the biosphere.

|   |   |
|---|---|
| A | B |
| C | D |

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Q22: Understand actions can increase or decrease the ecological footprint on the environment. (Unit:4, Page: 40)

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**Question 22a**

**Which of the following options gives two examples which help decrease our ecological footprint on the environment?**

- A) Using more single-use plastics and increasing resource consumption
- B) Deforestation and clearing land for large building projects
- C) Recycling materials and using renewable energy sources
- D) Driving individual gasoline cars and increasing home energy use

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

**Question 22b**

**Which of the following options gives two examples in which we increase our ecological footprint on the environment?**

- A) Burning fossil fuels and producing large amounts of waste
- B) Planting more trees and conserving fresh water supplies
- C) Reducing energy consumption and choosing sustainable products
- D) Protecting natural habitats and recycling electronic waste

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

Q23: Understand the relationship between Earth's tilt, sunlight distribution, and seasonal changes such as equinoxes and solstices. (Unit:4, Page: 67,68)

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## Question 23



### December Solstice

The December solstice is on December 21 or 22.  
On this day

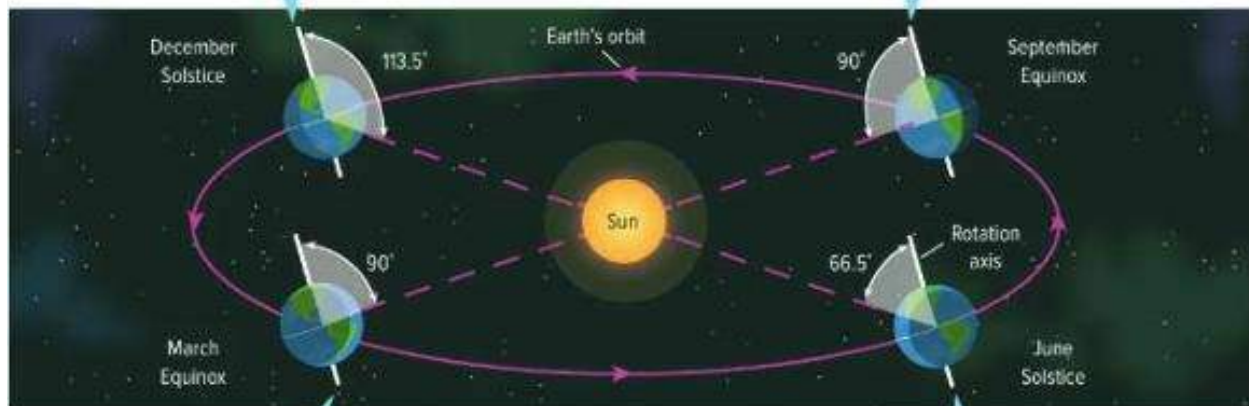
- the north end of Earth's rotation axis is away from the Sun;
- days in the northern hemisphere are shortest and nights are longest; winter begins;
- days in the southern hemisphere are longest and nights are shortest; summer begins.



### September Equinox

The September equinox is on September 22 or 23.  
On this day

- the north end of Earth's rotation axis leans along Earth's orbit;
- there are about 12 hours of daylight and 12 hours of darkness everywhere on Earth;
- autumn begins in the northern hemisphere;
- spring begins in the southern hemisphere.



### March Equinox

The March equinox is on March 20 or 21.  
On this day

- the north end of Earth's rotation axis leans along Earth's orbit;
- there are about 12 hours of daylight and 12 hours of darkness everywhere on Earth;
- spring begins in the northern hemisphere;
- autumn begins in the southern hemisphere.



### June Solstice

The June solstice is on June 20 or 21.  
On this day

- the north end of Earth's rotation axis is toward the Sun;
- days in the northern hemisphere are longest and nights are shortest; summer begins;
- days in the southern hemisphere are shortest and nights are longest; winter begins.

According to the text for the December Solstice, what happens to the days and nights in the northern hemisphere?

- A) Days are longest and nights are shortest.
- B) There are exactly 12 hours of daylight and 12 hours of darkness.
- C) Days and nights are equal in length as summer begins.
- D) Days are shortest and nights are longest.

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

On the September Equinox, how many hours of daylight and darkness occur everywhere on Earth?

- A) 24 hours of daylight and 0 hours of darkness.
- B) About 12 hours of daylight and 12 hours of darkness.
- C) 14 hours of daylight and 10 hours of darkness.
- D) About 8 hours of daylight and 16 hours of darkness.

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

During the March Equinox, which season begins in the northern hemisphere and which season begins in the southern hemisphere?

- A) Spring begins in the northern hemisphere; autumn begins in the southern hemisphere.
- B) Autumn begins in the northern hemisphere; spring begins in the southern hemisphere.
- C) Winter begins in the northern hemisphere; summer begins in the southern hemisphere.
- D) Summer begins in the northern hemisphere; winter begins in the southern hemisphere.

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

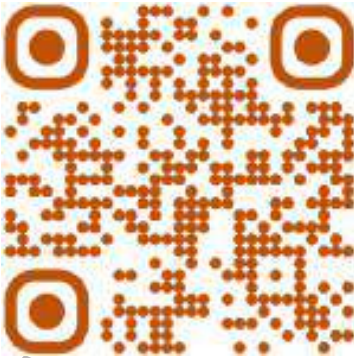
Based on the June Solstice description, where is the north end of Earth's rotation axis directed relative to the Sun?

- A) It leans along Earth's orbit.
- B) It is pointed directly away from the Sun.
- C) It is toward the Sun.
- D) It is parallel to the southern hemisphere.

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

Q24: Understand the phases of the Moon and how its position relative to Earth and the Sun affects its visible illumination. (Unit:4, Page: 85,86,89)

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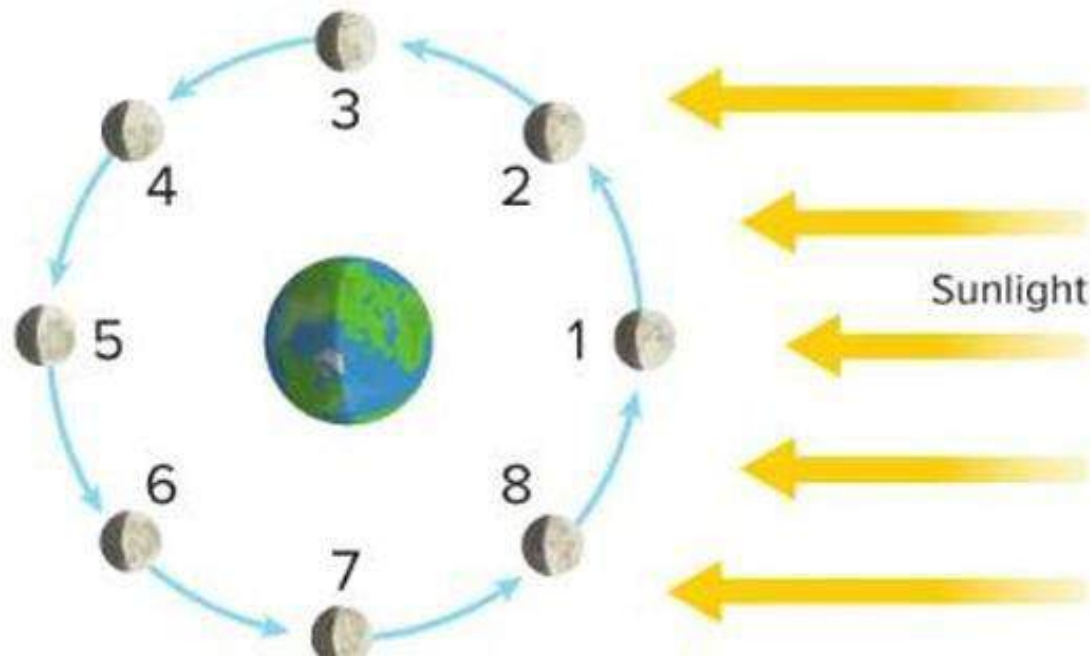
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**Question 24a**

**Predict the locations when the moon is in a waxing phase?**

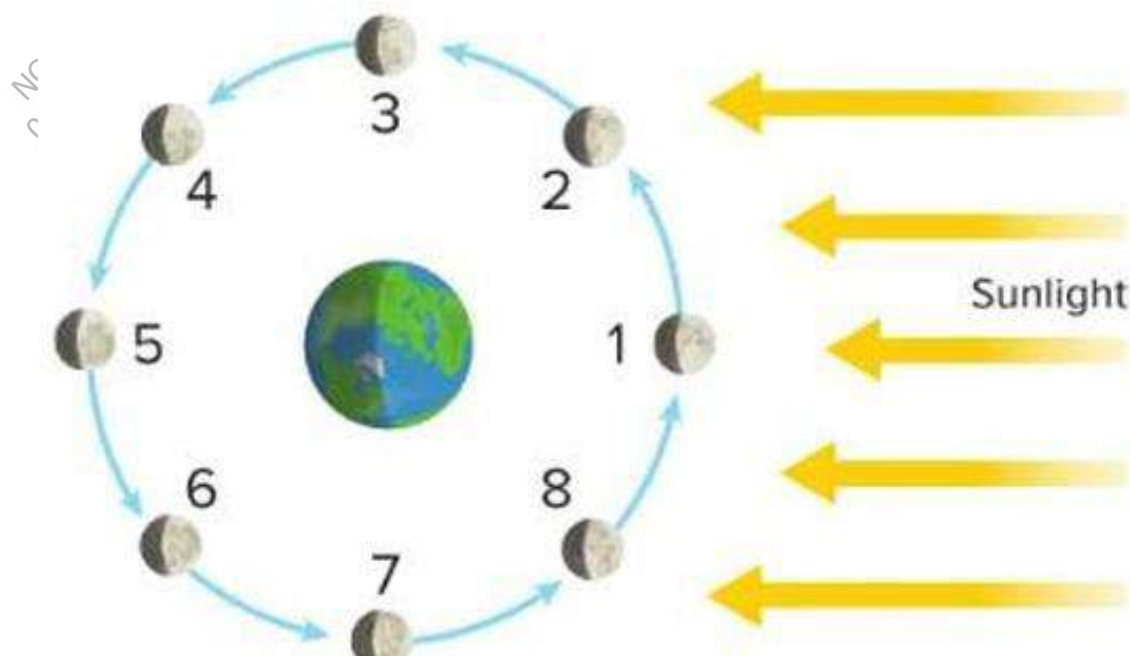


- A) Locations 6, 7, and 8
- B) Locations 2, 3, and 4
- C) Locations 1 and 5 only
- D) Locations 5, 6, and 7

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

### Question 24b

Predict the locations when the moon is in a waning phase?

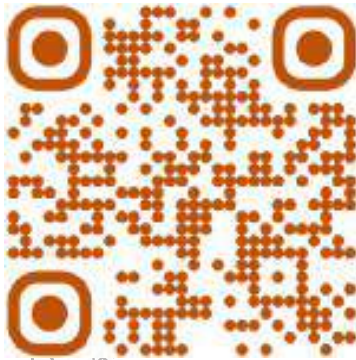


- A) Locations 6, 7, and 8
- B) Locations 2, 3, and 4
- C) Locations 1, 2, and 3
- D) Locations 4 and 5 only

|   |   |
|---|---|
| A | B |
| C | D |

Q25: Understand the relative positions of the Sun, Earth,  
and Moon and how they produce solar and lunar eclipses.  
(Unit:4, Page: 102)

**الأسئلة الموضوعية - MCQ**



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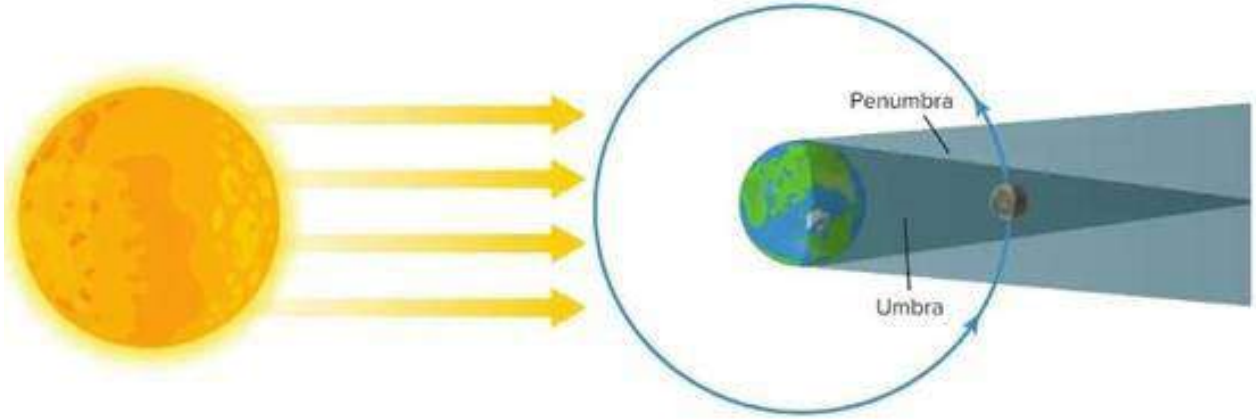
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**Question 24b**

**What type of eclipse is shown in the image below?**

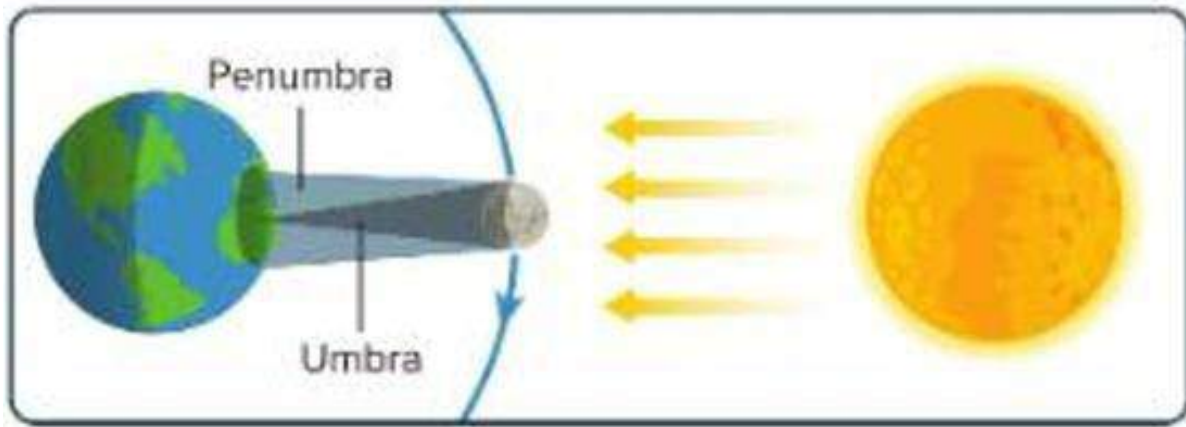


- A) Lunar eclipse
- B) Solar eclipse
- C) Annular eclipse
- D) Partial solar eclipse

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |

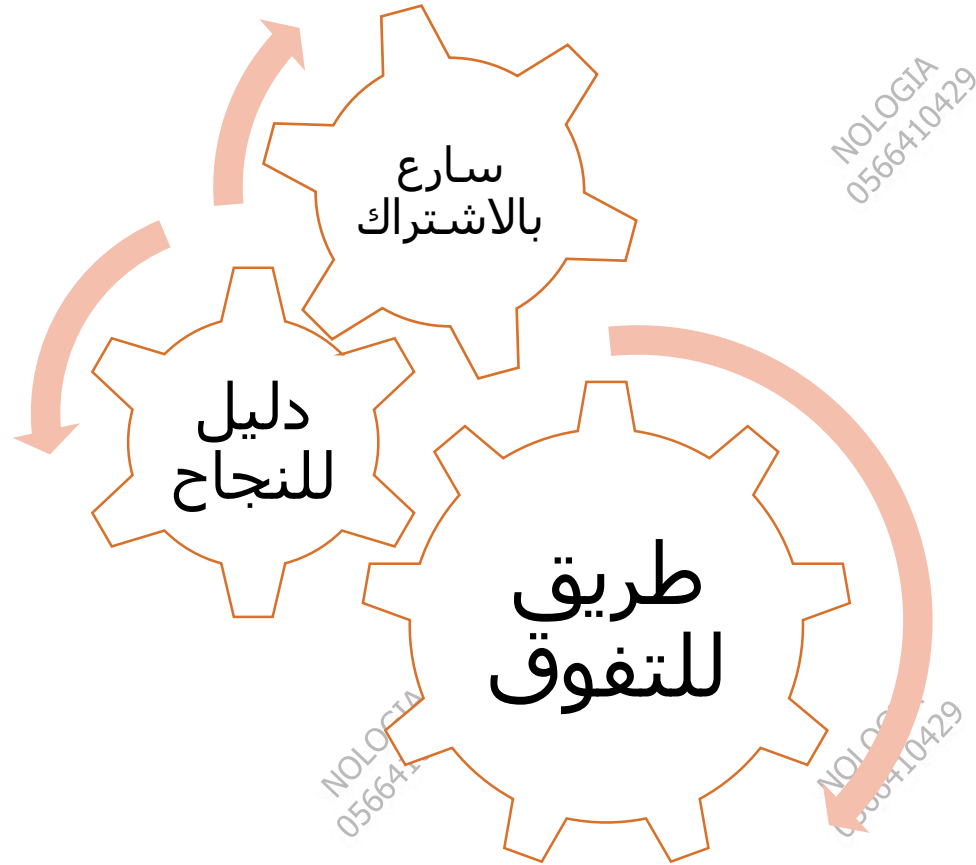
**Question 24b**

**What type of eclipse is shown in the image below?**



- A) Lunar eclipse
- B) Solar eclipse
- C) Annular eclipse
- D) Partial solar eclipse

|          |          |
|----------|----------|
| <b>A</b> | <b>B</b> |
| <b>C</b> | <b>D</b> |



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